Effect of Bone Graft Type on Fusion Rates Following Anterior Thoracoscopic Scoliosis Correction

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Introduction: Bone graft is generally considered fundamental in achieving solid fusion in scoliosis correction and pseudarthrosis following instrumentation may predispose to implant failure. In thoracoscopic anterior-instrumented scoliosis surgery, autologous rib or iliac crest graft has been utilised traditionally but both techniques increase operative duration and cause donor site morbidity. Allograft bone and bone morphogenetic protein (BMP) alternatives may improve fusion rates but this remains controversial. This study's objective was to compare two-year postoperative fusion rates in a series of patients who underwent thoracoscopic anterior instrumentation for thoracic scoliosis utilising various bone graft types.

Methods: 19 patients who had thoracoscopic anterior-instrumented scoliosis correction using identical instrumentation between May 2000 and August 2005 were identified from a surgical database. Following discectomy, intervertebral spaces were packed with either autologous rib-heads (8 patients), iliac crest (1 patient), or femoral-head allograft (10 patients). Thoracic fusion quality and implant integrity were evaluated using CT two years following surgery. Fusion was assessed using a modified Sucato method. Each level was graded using a 4-point scale based upon fusion across the disc-space. Fusion was considered solid with a score ≥ 3. Data was analysed with non-parametric tests.

Results: Nine patients had evidence of rod fracture. All implant failures occurred in the group who received either rib head or iliac crest graft. There were no rod fractures in the femoral allograft group. Mean fusion grades in the autologous bone graft group was 1.91 and 3.30 in the allograft group ($p=0.001$).

Conclusion: Significantly better rates of fusion occurred in thoracoscopic anterior instrumented scoliosis correction using femoral allograft compared to autologous rib-heads and iliac crest graft. This may be partly explained by the difficulty obtaining sufficient quantities of autologous graft in the adolescent patient group. Lower fusion rates in the autologous graft group appeared to predispose to rod fracture although the clinical consequence of implant failure is currently uncertain and the subject of an ongoing research project for a larger group of patients.